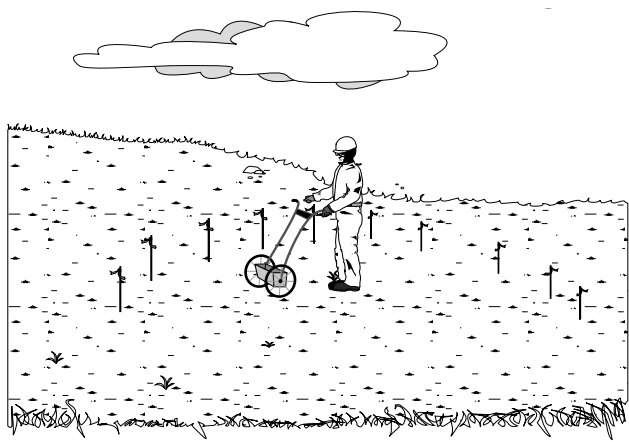


Soil Amendments



Soil amendments can be used to improve or correct soil conditions compromised by spilled substances so that plants can grow. If soil testing (Tactic AM-4) shows that *extreme* pH or salinity conditions exist in the soil, applying an amendment may be appropriate. Tundra soils can be naturally acidic or saline (Tactic P-2). If the soil at the site is acidic or saline, but the levels are comparable to background test results, amendments should not be applied to the site.

Saline soil conditions cannot be corrected using gypsum or calcium nitrate solution unless adequate water supply and drainage (flushing) exists at the site.

Examples of Soil Amendments Used for North Slope Tundra

AMENDMENT	PURPOSE
Lime	To buffer overly acidic soil after a spill involving an acidic substance
Gypsum	Calcium source to remove salt (sodium and chloride ions) after a seawater or other type of salt spill
Liquid calcium nitrate	Calcium source to remove salt (sodium and chloride ions) after a seawater or other type of salt spill

How to Apply

Lime and gypsum are available in powder form and can be applied by hand or by using a cyclone spreader. Cyclone spreaders are commercially available in different capacities and models that can be pushed, pulled with a vehicle, or carried by one person on foot. Lime or gypsum may be applied simultaneously with fertilizer (Tactic T-17) and seed (Tactic T-21). Even distribution of powdered soil amendments may require some practice. One method is to measure and mark off an area to be amended, fill the spreader with the amount of powdered amendment appropriate for the given area, and move in a grid pattern at a steady pace over the area multiple times until the spreader is empty. Calibrate the spreader before use.

Liquid calcium nitrate can be applied to small sites using weed sprayers or watering cans, or to larger sites using a hydroseeder or some similar piece of equipment. The distribution method is similar to that of powders. A given amount of product is sprayed methodically over a given area to achieve even distribution at the correct application rate. Calibrate the spreader before use.

How Much to Apply

Application rates of soil amendments are site-specific and should be calculated by a soils laboratory. Provide the laboratory with a target pH range (background concentration), and the laboratory will calculate the application rate of a given soil amendment based on the site sample results. The manufacturer of liquid calcium nitrate will provide information on how much is needed (based on laboratory data) for a certain area to achieve a certain salinity range.

APPLICABILITY

- *Spilled Substance*: All
- *Tundra Types*: All
- *Season*: Spring, summer, fall

CONSIDERATIONS AND LIMITATIONS

- Applying soil amendments to correct any but the most extreme soil conditions could have drastic effects on species composition and abundance.
- A site must have adequate moisture and drainage (either natural or mechanical flooding and drainage) in order to wash out sodium and chloride ions using gypsum or calcium nitrate solution.
- Soil samples must be sent to a soils laboratory, not a commercial analytical laboratory. (The University of Alaska Fairbanks Agricultural and Forestry Experiment Station has one.)
- Extremely alkaline tundra soils are not readily correctable with amendments.
- Arctic scientists have adapted for tundra treatment regimes the soil amendment practices used in temporal-zone horticulture and agriculture. This tactic has been used to correct soil pH or salinity conditions in North Slope wet and moist tundra soils with varying degrees of short-term success (Jorgenson and Cater, 1994; Reiley et al., 1995; McKendrick, 1996a). No test data exist which document whether the use of this tactic results in long-term benefits to tundra restoration compared with other tactics, combinations of tactics, or “no action.”

EQUIPMENT, MATERIALS, AND PERSONNEL

- Necessary quantity of appropriate soil amendment
- Cyclone spreader (1 operator) – to broadcast powdered soil amendments
- Vehicle approved for tundra travel (1 operator) – to pull a cyclone spreader over larger sites (optional)
- Weed sprayer or watering can (1 operator) – to spray liquid soil amendments on small sites
- Hydroseeder or similar equipment (2 operators) – to spray liquid soil amendments on larger sites